DEPARTMENT OF CONSUMER & INDUSTRY SERVICES
DIRECTOR'S OFFICE
GENERAL INDUSTRY SAFETY STANDARDS

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(By authority conferred on the director of the department of consumer and industry services by sections 16 and 21 of Act No. 154 of the Public Acts of 1974, as amended, and Exectutive Reorganization Order No. 1996-2, being §§408.1016, 408.1021, and 445.2001 of the Michigan Compiled Laws)

R 408.11436 is rescinded.

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PART 14. CONVEYORS

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GENERAL PROVISIONS

R 408.11401. Scope.

Rule 1401. This part applies to the construction, maintenance and operation of conveyors and conveying machinery in, about or around employment. This part does not apply to industrial trucks, underground mining conveyors, passenger conveyors, stacker cranes, driverless electronic tugs or construction equipment.

R 408.11403. Definitions A to C.

Rule 1403. (1) "Aisle" means a path of travel for vehicles and employees.

(2) "Auger or screw conveyor" means a revolving pipe or shaft on which is mounted helically shaped flighting which serves to convey bulk materials along a trough or a defined path. See figure 1.

(3) "Belt conveyor" means an endless belt operating between a drive and a tailend, with or without bend terminals, and over idler rolls or slider beds which handles bulk materials, packages or objects placed directly on the belt. See figure 2.

(4) "Belt tripper" means a device incorporating a system of pulleys which cause a conveyor belt to load or unload material at 1 or more points along the length of a belt conveyor. See figure 3.

(5) "Bucket, gravity discharge or pivoted bucket conveyor" means a series of buckets mounted between 2 endless chains or on a belt which may operate in horizontal, inclined or vertical paths. See figure 4.

(6) "Conveyor" means a horizontal, inclined or vertical device for moving or transporting bulk materials, packages or objects in a predetermined path by design and having points of loading or discharge fixed or selective.

(7) "Cross over" means a stile-like device used to cross over a conveyor or machine.

R 408.11404. Definitions D to I.

Rule 1404. (1) "Declined conveyor" means a conveyor transporting down a slope.

(2) "Extendable conveyor" means a conveyor which may be lengthened or shortened by power to suit operating needs.

(3) "Hanger" means a bearing, housing or frame which supports a shaft below a point at which the hanger is attached to the conveyor frame, trough or other structure.

(4) "Hinged section" means a section of conveyor equipped with a hinge mechanism for movable service.

(5) "Horizontal reciprocating or walking beam conveyor" means a reciprocating beam or beams that through hinged flights, special fixtures or other means advances material in a horizontal plane. See figure 7.

(6) "Inclined conveyor" means a conveyor transporting up a slope.

(7) "Indexing" means the controlled starting or stopping of a conveyor by distance or time.

R 408.11405. Definitions L to N.

Rule 1405. (1) "Live roller conveyor" means a series of rollers over which objects are moved by application of power to some or all of the rollers.

(2) "Means of egress" means a continuous path of travel from any point in a building to the open air outside at ground level.

(3) "Monorail or trolley conveyor" means a series of trolleys supported from or within an overhead track and connected by an endless propelling medium, such as a chain, cable or other linkage, with loads usually suspended from the trolley.

(4) "Nip point" means that point where a moving object creates a pinch or shearing action with a fixed or another moving object.

R 408.11406. Definitions P.

Rule 1406. (1) "Passageway" means a path of travel for foot traffic only.

(2) "Pinch point" means a point at which it is possible to be caught between moving parts of a machine or between moving and stationary parts of a machine, or between the material and any part of the machine.

(3) "Pneumatic conveyor" means a system of tubes or ducts through which objects or bulk materials are conveyed by a pressure or vacuum system. See figure 5.

(4) "Portable conveyor" means a transportable conveyor, usually having supports which provide mobility. See figure 6.

(5) "Pulley" means a wheel, usually cylindrical but sometimes polygonal in cross section, with the wheel's center board for mounting on a shaft and used to transmit power or change direction.

R 408.11407. Definitions R to V.

Rule 1407. (1) "Rollback" means an uncontrolled run of a conveyor down an inclined slope opposite to the direction of intended travel.

(2) "Roller conveyor" means a series of rollers supported in a frame over which packages or objects are moved manually, by gravity or by power. See figure 8.

(3) "Runaway" means an uncontrolled run of a conveyor on a declined slope in the direction of intended travel.

(4) "Safety factor" means the ratio of the breaking strength of a piece of material or object to the maximum designed load or stress applied when in use.

(5) "Safety limit switch" means a final device used to disconnect power to a conveyor in case of control or operator failure.

(6) "Slat conveyor" means 1 or more endless chains to which nonoverlapping, noninterlocking, spaced slats are attached to form a moving support for packages or objects being conveyed. See figure 9.

(7) "Suspended tray conveyor" means pendant trays or carriers attached to 1 or more endless chains which receive and deliver packages or objects at 1 or more locations. See figure 10.

(8) "Vertical reciprocating conveyor" means a conveyor with power or counterbalanced gravity actuated carriers which receive and discharge material to other elevations.

R 408.11411. Employers' and employees' general responsibilities.

Rule 1411. (1) An employer shall provide training to an employee working on or by a conveyor regarding the hazards and safeguards of such work.

(2) An employer shall establish an inspection program to maintain conveyor components in a condition which does not constitute a hazard to the employee.

(3) An employee shall not ride, cross or walk on a conveyor unless it is designed for riding or crossovers are provided as specified in rule 1425, except a floor-level slat type conveyor moving at not more than 60 feet per minute. A chain or cable conveyor used to tow objects does not require a crossover if the conveyor is not more than 8 inches above the floor, 12 inches in width and painted yellow in color.

R 408.11412. Maintenance.

Rule 1412. (1) Lubrication shall be accomplished by 1 of the following methods:

(a) Scheduling when a conveyor can be shut off and locked out.

(b) Automatic pressure or gravity feed system.

(c) Extension pipe leading to an area outside of guards or away from any hazard.

(2) In any case, rule 732, which concerns lubrication, of the general industry safety standards commission standard, Part 7, Guards for Power Transmission, being R 408.10732 of the Michigan Administrative Code, shall be complied with.

(3) Repairs or clean up, where unexpected motion would cause injury, shall be done when power is off and locked out.

(4) A walkway or catwalk along a conveyor shall be maintained clear of spills or other obstruction which may be a slipping or tripping hazard.

(5) A flammable cleaning fluid used in splicing of belts shall be kept in a safety container. Welding, cutting or smoking shall not be permitted in the area where flammable cleaning fluids are being used.

DESIGN PROVISIONS

R 408.11421. Guarding.

Rule 1421. (1) Where a hazard exists, guards shall be provided to protect an employee from contact with moving parts where adjustments are required when a conveyor is in operation.

(2) A lift or transfer point shall have any nip point guarded and shall have a means of complying with power lockout rules prescribed in subrule (1) of rule 1431.

(3) A conveyor which indexes shall be guarded so that an employee will not be caught or trapped by the sudden movement of the conveyor.

(4) A conveyor shall be guarded so that an employee will not be caught or trapped between the conveyor and a stationary or moving part.

(5) A trolley conveyor installed overhead and dipping to a work station shall have a tray-type guard or standard barrier pursuant to rule 231 of the general industry safety standards commission standard, Part 2, Floor and Wall Openings, Stairways, and Skylights, being R 408.10231 of the Michigan Administrative Code or the area shall be designated as nonpedestrian and telltales shall be hung along the portion of the conveyor that dips to protect an employee from accidental injury.

(6) An opening for a conveyor through a floor or wall shall be guarded pursuant to rule 213 of the general industry safety standards commission standard, Part 2, Floor and Wall Openings, Stairways, and Skylights, being R 408.10213 of the Michigan Administrative Code.

(7) A conveyor passing over a walkway, passageway or work area shall be provided with a pan or screen type guard

containing sides sufficient to contain any falling material which would cause injury. The designed strength of the guard shall be capable of and shall continue to withstand the maximum impact load.

R 408.11422. Counterweights.

Rule 1422. (1) A counterweight and its pulleys shall be enclosed pursuant to rule 730(2) of the general industry safety standards commission standard, Part 7, Guards for Power Transmission, being R 408.10730 of the Michigan Administrative Code.

(2) A counterweight and its pulleys suspended more than 7 feet above the floor or ground, in an area where an employee could walk, shall have an enclosure around the area of impact or a catch pan under the counterweight of such strength and design to hold the counterweight and pulley from dropping to the ground, floor or platform.

(3) A counterweight attached to an arm shall have a bolt fastened near the end of the arm or a cable or chain attached to the counterweight to prevents its dropping off the arm.

R 408.11423. Take up.

Rule 1423. Where a spring take-up is used to maintain tension on a conveyor the spring and fastening assembly shall be constructed to retain the spring assembly in case of breakage.

R 408.11424. Hinged sections.

Rule 1424. (1) A manually operated hinged section for employee passage through a gravity roller conveyor, chute, belt or other type of conveyor that requires more than a 40 pound lifting effort to operate shall be counterbalanced.

(2) A power operated section for employee passage shall be provided with a mechanical safety device which shall prevent the section from falling in case of power failure.

(3) A power conveyor having a hinged section used for the purpose of clearing a passageway shall be designed so that the section cannot be raised while the conveyor is in operation or the material being conveyed shall be stopped when the section is raised.

R 408.11425. Crossovers.

Rule 1425. (1) A clearance of 80 inches above a floor or platform shall be maintained in a means of egress. Where a conveyor reduces this clearance, a crossover, passageway or different means of egress shall be provided.

(2) A crossover shall be equipped with slip resistant treads, a railing and toeboard as specified in the general industry safety standards commission standard, Part 2, Floor and Wall Openings, Stairways, and Skylights, being R 408.10201 to R 408.10241 of the Michigan Administrative Code.

(3) A crossover which cannot clear packages or objects on the conveyor shall be hinged to swing out of the way or a sensing device shall be provided to stop the conveyor if the crossover has not been moved.

R 408.11426. Passageways and walkways.

Rule 1426. (1) A passageway under a conveyor shall have not less than 5 feet of headroom except a main aisle shall not have less than 80 inches of headroom. Where the headroom is less than 80 inches, telltales and illumination of not less than 10 foot candles shall be provided to indicate low headroom.

(2) A maintenance walkway shall be not less than 18 inches wide where it runs along a conveyor.

(3) A walkway along a conveyor in a pit or tunnel shall have illumination of at least 10 foot candles when an employee is required to work in an area.

R 408.11427. Safety factors.

Rule 1427. (1) Structural supports of a conveyor shall be designed and constructed with a minimum design safety factor of at least 3 which shall include static and dynamic loads.

(2) A hook or carrier used on a monorail and a trolley conveyor to carry objects shall be designed with a minimum safety factor of 5 and maintained to hold the object or carriers without creating a hazard.

R 408.11428. Adjustment.

Rule 1428. A conveyor capable of adjustment to variable fixed elevations shall be equipped with a locking device to hold the conveyor at any attitude where failure to hold would create a hazard to an employee.

R 408.11429. Rollbacks and runaways.

Rule 1429. Rollbacks and runaways on a conveyor shall be controlled by 1 or more of the following:

(a) Track design.
(b) Back stops.
(c) Ratchets or one-way clutch on drive pulleys.
(d) Anti-runaway devices.
(e) Automatically applied brakes.

ELECTRICAL PROVISIONS

R 408.11431. Lockout.

Rule 1431. (1) An employer shall establish and maintain a lockout procedure which shall safeguard an employee.

(2) An electrically powered conveyor shall be equipped with a disconnect switch at the power source which shall be shut off and locked out during any type of repair, service or set up work if a hazard exists.

R 408.11432. Starting.

Rule 1432. (1) A starting button, except a control button in a console for a manually programmed multi conveyor system, shall be equipped with a device to prevent accidental actuation.

(2) A powered conveyor, which would cause injury when started shall not be started until employees in the area are alerted by a signal or by a person in authority that the conveyor is about to start.

(3) Power to a conveyor shall be wired so that after an interruption of electrical service, the conveyor shall not automatically restart upon resumption of electrical service.

R 408.11433. Stop devices.

Rule 1433. (1) An emergency stop device shall be available at each point of operation where a hazard exists and within reach of an employee at that point.

(2) An emergency stop device of the momentary-contact type shall have a means of being maintained by a device in the “off” position.

(3) If more than 1 stop device is located along a conveyor, the devices shall be wired so that the conveyor can be made restartable only at the location where stopped.

(4) A stop device, except a pull cord, shall be distinguished by its red color.

(5) Conveyors in a series shall be electrically interlocked so that when any conveyor in the series is stopped for any reason, the initial stopping shall cause the upstream conveyors to stop if continued operation creates a hazard.

R 408.11434. Switches.

Rule 1434. (1) An electrical outlet for 220 volts or more to which a portable conveyor is connected shall be equipped with a disconnect switch which shall be opened before connecting or disconnecting the plug. A load breaking plug may be used in place of the disconnect switch.

(2) A safety limit switch shall not be used as an operating control device.

R 408.11435. Grounding.

Rule 1435. (1) An electrically powered portable or permanently installed conveyor shall be grounded.

(2) Where an explosion hazard exists, such as but not limited to dust or fumes, a means of draining the potential static electricity build up shall be provided and used.

R 408.11436. Rescinded.

SPECIFIC PROVISIONS

R 408.11441. Auger and screw conveyors.

Rule 1441. An auger or screw conveyor, with an opening not screened or covered and secured by bolts or clamps, shall be equipped with an interlocked cover which shall cut the power when raised and not start until the cover is replaced and the starter actuated.

R 408.11442. Belt conveyors.

Rule 1442. (1) A belt conveyor using a belt tripper or other moving deflector which requires an operator to travel on the belt tripper shall have the operator's platform designed to safeguard the operator from falling or coming in contact with moving or stationary parts.

(2) A nip point at a pulley shall be guarded by an enclosure or barrier constructed to prevent access by an employee's body members or loose clothing.

(3) A belt conveyor for bulk material shall have built up sides where material spilling over the sides is a hazard.

(4) A pulley with rotating shaft shall have projecting shaft ends covered or cut flush with the hanger.

(5) A shuttle or movable hopper mounted on wheels shall have sweeps fastened ahead of the wheels with an opening of not less than ⅜ inch between the sweep and the rail.

R 408.11443. Belt trippers.

Rule 1443. A belt tripper, with or without an operator, shall be equipped with a safety limit switch and a fixed stop to prevent over-run at each end of the runway which shall shut off the power if the tripper moves too close to the end of the runway.

R 408.11444. Bucket, pivoted bucket and gravity-discharge conveyors.

Rule 1444. A bucket, pivoted bucket or gravity-discharge conveyor shall be enclosed with a guard or barrier to protect operating personnel.

R 408.11445. Carrier and trolley conveyors.

Rule 1445. A manually powered carrier or trolley conveyor shall have a protective device on the carrier or rail to prevent the carrier from dropping off the rail or off the end of the rail.

R 408.11446. Extendable conveyors.

Rule 1446. An extendable conveyor shall be equipped with a device located on the outermost end which shall stop movement of the conveyor when contact is made by the device.

R 408.11447. Pneumatic conveyors.

Rule 1447. (1) A pneumatic conveyor shall be designed so that doors to pressure vessels cannot be opened when there is a positive internal pressure.

(2) A gasket holding line pressures shall be shielded to prevent a gasket leak from projecting the conveyed material into a work area if the material would cause a hazard.

(3) A receiver or storage bin shall be equipped with full bin indicators or controls to prevent overfilling, if overfilling will create a hazard.

(4) A pneumatic conveyor carrying oxidizable materials shall be designed for hazards, such as but not limited to explosion, fire or corrosion.

(5) A pneumatic conveyor serving an area containing contaminated air shall be designed so that the contaminated air cannot be transported to another area.

R 408.11448. Portable conveyors.

Rule 1448. The stability of a portable conveyor shall be provided by 1 or more of the following:

(a) Securing to a fixed object.
(b) Use of outriggers.
(c) A base width of not less than ⅓ the height.
(d) A base as wide as the distance from the floor to the center of gravity.

R 408.11449. Reciprocating conveyors.

Rule 1449. (1) A reciprocating conveyor shall have inside and outside nip point guarded.

(2) If the reciprocating member of a horizontal reciprocating conveyor moves within 18 inches of a wall or other object, a barrier shall be installed at the end to prevent access by an employee.

(3) A vertical reciprocating conveyor which is manually loaded or unloaded shall be guarded with an interlock door or gate to prevent an employee being caught within a nip point.

(4) The carriage and controls of a vertical reciprocating conveyor shall be designed and installed to prevent use of the conveyor as a man lift.

R 408.11450. Roller conveyors.

Rule 1450. (1) A roller conveyor with a hinged section or with an open discharge end shall be equipped with a stop device projecting above the rollers which shall prevent a package or object from being discharged off the conveyor unless it is so designed to discharge.

(2) Nip points between power and idler rolls or delivery conveyors and idler rolls shall be eliminated by 1 of the following:

(a) The idler roller set in a 45 degree incline slot in the direction of travel.
(b) Steel plates welded between the rolls with a maximum of ⅛ inch between the plate and rolls.
(c) The idler roll set in a horizontal slot and connected with an interlock switch which will stop the conveyor.
(d) A device which offers equal or better protection may be substituted for subdivisions (a), (b) or (c).

(3) The nip point between a belt and a carrier roller on a belt drive live roller conveyor shall be protected by pop-out type carrier rollers or steel plates as prescribed in subrule (2)(b). The belt conveyor shall be guarded as specified in rule 1442.

R 408.11451. Slat conveyors.

Rule 1451. (1) A slat conveyor with the slats spaced 1 inch or more apart and moving at floor level or in work areas shall have a solid smooth bed under the slats to prevent a shear hazard.

(2) A slat conveyor with slats more than ¼ inch but less than 1 inch apart and moving at floor level or in a work area shall not have any nip point less than 4 inches below the slats.

R 408.11452. Suspended tray or vertical opposed shelf chain conveyors.

Rule 1452. A suspended tray or vertical opposed shelf chain conveyor which is manually loaded or unloaded shall have safety devices, such as but not limited to lintel and sill switches or deflectors, to safeguard an employee.

R 408.11461. Clothing, jewelry and fire precautions.

Rule 1461. (1) Loose clothing and jewelry, including but not limited to long or floppy sleeve pants with large pantlegs or cuffs, rings, wrist watches, bracelets, ties and scarves shall not be worn around conveyors where they constitute a hazard to an employee.

(2) Where combustibles, such as but not limited to coal or grain, are conveyed or stored and where a fire caused by slippage between a drive pulley and a belt would create a hazard, the conveyor shall be equipped with a device so adjusted that a 5% loss of full load rated speed of the belt shall shut down the belt drive.

APPENDIX
TYPES OF CONVEYORS

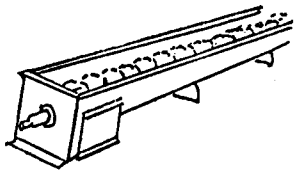

Fig. 1 — Auger or Screw Conveyor

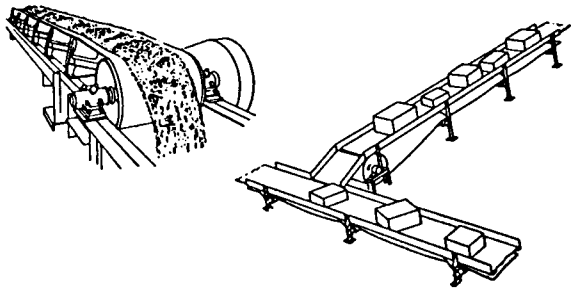

Fig. 2 — Belt Conveyors

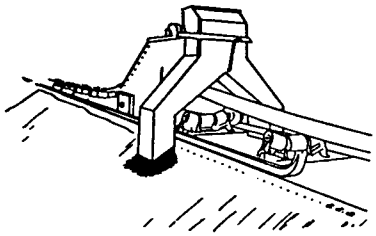

Fig. 3 — Belt Tripper

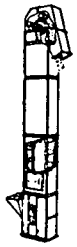

Fig. 4 — Bucket, Gravity Discharge or Pivoted Bucket Conveyor

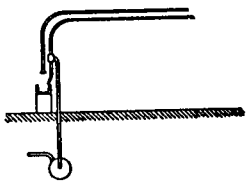

Fig. 5 — Pneumatic Conveyor

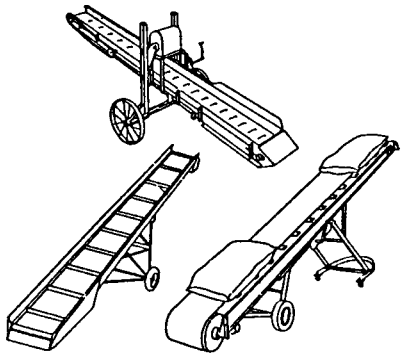

Fig. 6 — Portable Conveyors

Fig. 7 — Reciprocating Conveyor

Fig. 8 — Roller Conveyor

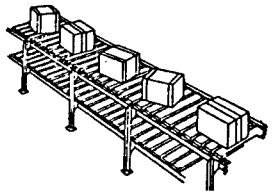

Fig. 9 — Slat Conveyor

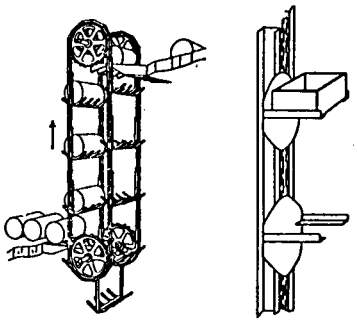

Fig. 10 — Suspended Tray Conveyors

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